REMARKS

The Office Action dated January 8, 2008 has been received and carefully noted. The above amendments to the claims and the following remarks, are submitted as a full and complete response thereto.

Claims 1-4, 6-19, 21-34 and 36-49 have been amended to more particularly point out and distinctly claim the subject matter of the invention. Claims 50-51 are newly added. No new matter has been added and no new issues are raised which require further consideration or search. Claims 1-4, 6-19, 21-34, 36-51 are submitted for reconsideration.

Claims 1, 2, 4, 6-17, 19, 21-32, 34 and 36-49 were rejected under 35 U.S.C. §102(e) as being anticipated by Ketchum et al. (U.S. Patent No. 6,138,026). This rejection is respectfully traversed for at least the following reasons.

Claim 1, upon which claims 2-4, 6-15 and 47 are dependent, recites a method that includes determining a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver in a telecommunication system. The method uses an extended channel model which depends on a non-orthogonal modulation matrix. The communication channel includes non-orthogonal modulation by the non-orthogonal modulation matrix. The modulation symbols are distributed using at least two radiation patterns, the performance measure being sensitive to the modulation. The method also provides controlling the communication resources based on the performance measure.

Claim 16, upon which claims 17-19, 21-30 and 48 are dependent, recites an apparatus that includes a determiner configured to determine a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver in a telecommunications system by using an extended channel model which depends on a non-orthogonal modulation matrix. The communication channel includes non-orthogonal modulation by the non-orthogonal modulation matrix. The modulation symbols are distributed using at least two radiation patterns, and the performance measure is sensitive to the modulation. The apparatus also includes a controller configured to control the communication resources based on the performance measure.

Claim 31, upon which claims 32-34, 36-45 and 49 are dependent, recites an apparatus that includes a performance measure estimator configured to determine a performance measure that characterizes performance of a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix. The communication channel includes non-orthogonal modulation by the non-orthogonal modulation matrix. The modulation symbols are distributed using at least two radiation patterns, and the performance measure is sensitive to the modulation. The apparatus also includes a controller connected to the performance measure estimator, the controller being configured to control the communication resources based on the performance measure.

Claim 46 recites an apparatus that includes means for determining a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix. The communication channel includes non-orthogonal modulation by the non-orthogonal modulation matrix. The modulation symbols are distributed using at least two radiation patterns, and the performance measure being sensitive to the modulation. The apparatus also includes means for controlling the communication resources based on the performance measure.

As will be discussed below, the teachings of Ketchum fail to disclose all of the elements of the claims, and therefore fails to provide the features discussed above. The rejection is respectfully traversed for at least the following reasons.

Ketchum does not disclose "determining a performance measure characterizing performance of a communication channel...the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix", as recited, in part, in independent claim 1, and similarly in independent claims 16, 31 and 46. The Office Action incorrectly relied on paragraph [0020] of Ketchum as allegedly disclosing the above noted features of claim 1.

Paragraph [0020] of Ketchum recites,

"Various aspects, embodiments, and features of the invention may be applied to any multi-channel communication system in which multiple transmission channels are available for data transmission. Such multi-channel communication systems include multiple-input multiple-output (MIMO) systems, **orthogonal** frequency division modulation (OFDM) systems, MIMO systems that utilize OFDM, and others. The multi-

channel communication systems may also implement code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), or some other multiple access techniques. Multiple access communication systems can support concurrent communication with a number of terminals (i.e., users)."

Among the different types of multi-channel communication systems noted above (e.g., MIMO, OFDM and MIMO-OFDM), none of these three system types include non-orthogonal modulation. Of the three multi-channel systems, any of them may implement one of the three common types of multiple access schemes (e.g., CDMA, TDMA and FDMA). These types of multiple access schemes are not modulation schemes. Because CDMA, TDMA and FDMA are multiple access schemes and are not modulation schemes, then none of CDMA, TDMA and FDMA can be possibly be referring to a modulation scheme that is non-orthogonal.

One scheme is time division multiple access (TDMA), where the orthogonal basis functions are non-overlapping rectangular pulses ("time slots"). Each transmitter is assigned a specific time slot for transmission of data, and no two transmitters transmit simultaneously in the same time slot. Therefore, it is clear that the receiver can reject an arbitrarily strong unwanted signal by listening to the communication channel for a correct time period defined by the time slot. As a result, TDMA is clearly an orthogonal multiple-access technique.

Another orthogonal scheme is frequency-division multiple access (FDMA), which refers to the use of a set of frequency multiplexed signals with an exact minimum frequency spacing needed to make them orthogonal so that they do not interfere with

each other. As was admitted by the Examiner in the telephone conversation, FDMA is also an orthogonal multiple-access technique.

Code division multiple access (CDMA) is also inherently an orthogonal multiple-access scheme due to the utilization of inherently orthogonal spreading codes. Even if the orthogonality of the spreading codes was compromised by using spreading codes which are not orthogonal, Ketchum provides no disclosure for non-orthogonal CDMA. Furthermore, such non-orthogonal CDMA would still fail to teach "non-orthogonal modulation by the non-orthogonal modulation matrix, wherein modulation symbols are distributed using at least two radiation patterns" as recited in claim 1. Multiplying a signal with a higher rate spreading code sequence does not fulfill the definition of the non-orthogonal modulation by the non-orthogonal modulation matrix, nor does it relate to distribution of the modulation symbols using at least two radiation patterns.

Multiple access techniques may use a multiple access technique that is orthogonal. CDMA, TDMA, and FDMA are all orthogonal multiple access techniques. Generally, orthogonality in multiple access techniques refers to the orthogonality that occurs when an ideal receiver can completely reject arbitrarily strong unwanted signals using different basis functions aside from the desired signal. CDMA, TDMA and FDMA all represent multiple access schemes used to separate different users and/or channels in a communications system. Conversely, modulation techniques may include phase-shift keying (PSK) modulation, quadrature amplitude modulation (QAM), etc. These modulation techniques modify the transmission bits of data into waveforms for

transmission over a communication channel. In other words, a modulation scheme prepares the number of bits defined by a modulation symbol and a waveform of the symbol.

In comparing multiple access schemes to modulation techniques, the multiple access scheme separates signals used by different users, while a modulation scheme modifies a signal of a single user into a form suitable for transmission over the communication channel. Therefore, the types of multiple-access schemes and modulation techniques utilized in a given system are different and independent of each other. Each multiple access scheme may utilize a different type of modulation. As a consequence, a multiple access scheme or its related properties are not comparable with the properties that define a particular modulation technique. As discussed above, TDMA, FDMA and CDMA should not be confused with modulation schemes because they are not modulation schemes and they may be used with any type of modulation.

As stated above, no part of paragraph [0020] teaches "determining a performance measure characterizing performance of a communication channel...the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix", as recited, in part, in independent claim 1, and similarly in independent claims 16, 31, 46, 50 and 51.

In addition to the above noted deficiencies of Ketchum, there is no teaching in Ketchum of determining performance of a communication channel using an "extended channel model which depends on a non-orthogonal modulation matrix", as recited, in

part, in claim 1. The Office Action alleged that the "channel state information" is comparable to determining performance of a communication channel using the extended channel model which depends on a non-orthogonal modulation matrix, as recited in claim 1. Applicant disagrees and submits that because Ketchum does not teach using a non-orthogonal modulation matrix, then Ketchum cannot possibly disclose that the channel state information provides such a feature when the channel state information is based on a channel that does not use a non-orthogonal modulation matrix.

Therefore, Applicants submit that Ketchum fails to teach all of the subject matter of independent claims 1, 16, 31, 46, 50 and 51. By virtue of dependency, Ketchum also fails to teach the subject matter of dependent claims 2, 4, 6-15, 17, 18-30, 32-45 and 47-49. Withdrawal of the rejection of claims 1, 2, 4, 6-17, 19, 21-32, 34 and 36-49 is kindly requested.

Claims 3, 18 and 33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ketchum et al. (U.S. Patent Publication No. 2003/0048856) in view of Cheng et al. (U.S. Patent No. 6,411,817). This rejection is respectfully traversed for at least the following reasons.

Ketchum is discussed above. Cheng discloses a method for controlling downlink power in a time-division multiplex wireless system. The method may provide different downlink transmit signal powers to different time-division multiplex channels of a single carrier. A base station receives a measured signal parameter data for a downlink transmit signal of a time-division multiplex channel. The base station determines an initial

adjustment for the downlink transmit signal power of the time division multiplex channel if the measured signal parameter data differs from a target signal parameter data. The base station determines a revised adjustment for the downlink transmit power of the time division multiplex channel based on the initial adjustment and at least one adjustment range as appropriate to achieve synchronization of the demodulation of the downlink transmit signal.

Claims 3, 18 and 44 are dependent upon claims 1, 16 and 31, respectively, and contain all of the limitations thereof. As discussed above, Ketchum fails to disclose or suggest all of the elements of claims 1, 16 and 31. In addition, Cheng fails to cure the deficiencies in Ketchum as Cheng also fails to disclose or suggest "determining a performance measure characterizing performance of a communication channel...the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix", as recited, in part, in independent claim 1, and similarly in independent claims 16, 31 and 46." Thus, the combination of Ketchum and Cheng fails to disclose or suggest all of the elements of claim 3, 18 and 44. Furthermore, claim 3, 18 and 44 should be allowed for at least their dependence upon claims 1, 16 and 31 and for the specific limitations recited therein.

For at least the reasons discussed above, Applicants respectfully submit that the cited references fail to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated

and unobvious. It is therefore respectfully requested that all of claims 1-4, 6-19, 21-34, 36-51 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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Enclosures: Additional Claims Fee Transmittal
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